

IN THE CLAIMS:

This listing of claims will replace all prior versions, and listing, of claims in the application.

Listing of the Claims:

1. (Original) A signal processing apparatus comprising a plurality of receiving means arranged to receive a composite signal indicative of a plurality of symbols transmitted, substantially simultaneously, from a plurality of remote transmission means, and processing means arranged to iteratively decode each most probable symbol contained in said composite signal, within a constrained enumeration formalism.
2. (Original) Apparatus according to Claim 1 wherein the processing means is arranged to define an enumeration constraint for use in the constrained enumeration formalism.
3. (Currently amended) Apparatus according to ~~either of Claims 1 or 2~~ wherein the processing means is arranged to perform a QR decomposition upon a channel gain matrix.
4. (Original) Apparatus according to Claim 3 wherein the enumeration constraint is a number of entries in an R matrix over which probable symbols are enumerated.
5. (Currently amended) Apparatus according to ~~any preceding claim 1~~ wherein the processing means is arranged to determine the most probable symbol by enumerating across all symbol conditional probabilities for each possible symbol.
6. (Original) Apparatus according to Claim 5 wherein the processing means is arranged to convert symbol conditional probability to a bit level logarithmic

likelihood ratio (LLR).

7. (Currently amended) Apparatus according to ~~any preceding~~ claim 1 including a parallel to serial conversion means arranged to convert parallel, bit level, LLR's into a single stream of LLR's.

8. (Original) Apparatus according to Claim 7 including a deinterleaving means arranged to deinterleave, bit level, LLR's from the single stream of LLR's.

9. (Currently amended) Apparatus according to ~~any preceding~~ claim 1 including decoding means arranged to apply iterative soft input soft output (SISO) decoding to single bit LLR's to determine a symbol.

10. (Original) Apparatus according to Claim 9 wherein the decoding means is arranged to pass a symbol probability to the processor for inclusion in an iterative enumeration step.

11. (Currently amended) Apparatus according to ~~either of Claims 9 or 10~~ including a hard decision unit that is arranged to determine a symbol based upon a soft output from the decoding means.

12. (Original) A method of signal processing for a MIMO system comprising the steps of:

- i) receiving a composite signal indicative of a plurality of symbols;
- ii) performing a **QR** decomposition upon a channel gain matrix for the composite signal;
- iii) defining an enumeration constraint;
- iv) calculating possible conditional probabilities for one of the plurality of symbols contained within the composite signal, using the enumeration constraint; and

- v) iterating step iv), incorporating a most probable symbol for the one symbol determined in the previous iteration of step iv) in the conditional probability calculation operation.

13. (Original) A method according to Claim 12 including setting the enumeration constraint to encompass a sub-set of possible transmit antennas.

14. (Currently amended) A method according to ~~either of Claims 12 or 13~~ including defining the enumeration constraint as a number of elements within an R matrix.

15. (Currently amended) A method according to ~~any one of Claims 12 to 14~~ including calculating a symbol conditional probability in order to determine the most probable symbol received over a given transmission channel.

16. (Original) A method according to Claim 15 including converting the symbol conditional probability to bit level logarithm likelihood ration (LLR).

17. (Currently amended) A method according to ~~any one of Claims 12 to 16~~ including converting a plurality of parallel streams of bit level LLR's to a serial stream of bit level LLR's.

18. (Original) A method according to Claim 17 including deinterleaving bit level LLR's from the serial stream of bit level LLR's.

19. (Currently amended) A method according to ~~any one of Claims 16 to 18~~ including decoding the single bit LLR's.

20. (Currently amended) A method according to ~~any one of Claims 12 to 19~~ including making a hard determination of a received symbol based upon a soft output from the decoding operation.

21. (Original) A method of reducing the computational load of a signal processor in MIMO architectures comprising the steps of:

- i) receiving composite input signals having spatial diversity from each of a set of n receiver elements;
- ii) constructing an n by m channel matrix from values indicative of channel gains between each transmit and receive element;
- ii) executing a **QR** decomposition upon the channel matrix to form an upper triangular **R** matrix and a unitary **Q** matrix;
- iii) enumerating to determine probabilities of a given symbol being transmitted from a given transmitter using a constrained data sub-set of the triangular matrix; and
- iv) making a hard decision about which possible symbol is the most probable symbol to have been transmitted so as to reduce the number of enumerations required to carry out a further probability calculation.

22. (Original) The method of Claim 21 including using sub-optimally determined symbol values to generate final definite symbol values.

23. (Currently amended) A computer readable medium having therein instructions for causing a processing unit to execute the method of ~~any one of~~ Claims 12 to 20.

24. (Currently amended) A computer readable medium having therein instructions for causing a processing unit to execute the method of ~~either of~~ Claims 21 or 22.